

THREE DECADES OF AVIFAUNAL CHANGE IN AN INNER SUBURB OF PERTH, 1977–2009

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ABSTRACT

During a 32 year residence in the suburb of West Leederville, only 2–4 km from the Perth GPO, 35 bird species were recorded, six of which have been introduced to the metropolitan region. Apart from general observations made opportunistically over the entire suburb, bird species were recorded during 361 weeks (7 years) at two successive places of residence. Annually, the five species most frequently recorded on a weekly basis were Singing Honeyeater, Laughing Dove, Australian Raven, Australian Ringneck, and Red Wattlebird. Two introduced species (Rainbow Lorikeet, first recorded in 1983 and Rock Dove, 1993) have established in the suburb, and two native species (Willie Wagtail, 1993 and White-checked Honeyeater, 2006) have re-established in the suburb. Ten species increased markedly in their frequency of occurrence during the study, though this interpretation is complicated by a change in place of residence in 1992. Only one species (Tree Martin) declined in frequency of occurrence. These results are discussed in terms of the history of urbanization of the district and historical changes in the avifauna of the western suburbs of Perth. Suggestions are offered for improving habitat quality and quantity for bird species.

INTRODUCTION

Because of the destruction of native vegetation in order to build transport routes, keep livestock, grow fruit trees, and ultimately to provide spaces for housing, there has been a progressive, cumulative and extensive loss of habitat for native animals in suburban areas.

Consequently, the bird fauna of suburbs is much reduced, and most species are now locally extinct (Stranger 1993, 2001; Grayson *et al.* 2007).

Despite most bird watchers living in suburbs, these areas are evidently regarded by ornithologists and bird watchers as uninteresting. Few lists have been

published apparently because bird watchers prefer to visit areas of native bushland (Serventy 1938; Van Delft 1985, 1997; Agar 2008). West Leederville is not listed in the indexes of *Western Australian Bird Notes* for the period 1943–1994 (Anon. nd; Buchanan nd). Nor is it represented on the Birds Australia Western Australia database. No sites in this suburb were included in the 1985 metropolitan bird project (Van Delft 1997) or the 1996–7 suburban bird survey (Nealon 1996, 1997). Searches in available issues of *Gould League Notes* (1940–60) and *The Bird Lover* (1951–58) also yielded no lists for West Leederville.

Since 1977 I have lived in West Leederville, an inner suburb of some 120 ha, the eastern border of which is only 2 km from the Perth GPO. Situated north-west of Perth, the suburb is bounded by Loftus, Cambridge and Southport Streets, Lake Monger Drive, Kavanagh, Joseph, Cambridge, and McCourt Streets, and Railway Parade. Until 1977 this area was part of the suburb of Leederville (bounded by Wembley, Mount Hawthorn, North Perth, West Perth and Subiaco), but the construction of Mitchell Freeway isolated the area to the west.

The history of clearance of native vegetation in West Leederville is not well known. In the 1830s it was probably restricted to around Lake Monger (Pitt Morison 1979). South of this lake, but mostly west of (the later

named) Connolly Street, clearing commenced in 1851 when the Catholic Church purchased 200 acres of land for a monastery and olive grove, and was well advanced by 1863 when vineyards and orchards were established (Bourke 1979; Spillman 1985). The next major intrusion was the completion in 1880 of the Perth-Fremantle railway (*The West Australian* 2.11.1880: 3), which later defined the southern boundary of the suburb. By 1883 the future suburb of West Leederville was further delimited by surveyed suburban allotments to the south (Subiaco) and east (West Perth) (Pitt Morison 1979; Spillman 1985). The name Leederville was first used in 1893 (*The West Australian* 18.12.1893: 6), the first streets were named in 1895 (WA Directory 1895), and the area was proclaimed a municipality in 1896 (*The West Australian* 8.4.1896: 4).

The objective of my study was to list the avifauna of West Leederville since 1977, and to record any changes in the avifauna at a local scale (based on records accrued successively at two places of residence).

METHODS

In March, July, and August 1977 I began casually to record bird species seen around my home at 73 Woolwich Street (opposite Carlton Street), but it was not until 1980 that I became more methodical. In April 1993 I moved to 1 Caddy Avenue, 360 m

to the south-east. My method was to record during each week the presence of all bird species seen or heard from my residence during seven separate years (calendar, fiscal, or other 12 month period) within a period of 27 years (1980–2007). However, waterbirds seen or heard calling when flying overhead were disregarded.

Opportunity to record birds routinely presented itself each morning before I went to work, each afternoon following my return from work, and during Saturday and Sunday when at home. Relevant and opportunistic observations of birds and their habits and habitats throughout the suburb were also made during the period March 1977 to November 2009.

Dates when I methodically recorded bird species at my residences are as follows:

1980: 7 January–28 December (50 weeks; no observations 31 December 1979–6 January 1980 or 11–17 August).

1981: 29 December 1980–27 December 1981 (50 weeks; no observations 25–31 May or 24–30 August).

1982: 28 December 1981–2 January 1983 (52 weeks; no observations 7–13 June).

1983: 3 January 1983–1 January 1984 (52 weeks).

1993/4: 24 April 1993–23 April 1994 (53 weeks).

1994/5: 30 April 1994–22 April 1995 (52 weeks).

2006/7: 2 July 2006–30 June 2007 (52 weeks).

Names used are those recommended by Christidis and Boles (2008).

RESULTS

During March 1977 I recorded only four species, Singing Honeyeater, Laughing Dove, Silveryeye and Brown Honeyeater, with an additional five species in July and August (Black-faced Cuckoo-shrike, Australian Ringneck, Carnaby's Black-cockatoo, Australian Raven and Laughing Kookaburra).

Frequency of occurrence of species

During the 361 weeks of methodical study (Table 1), a total of 35 landbird species were recorded, six of which are introduced to south-west Western Australia (WA). Most species were recorded during all seven years of study, though not all at the same frequency of occurrence. The five most frequently recorded species were Singing Honeyeater (most), Laughing Dove, Australian Raven, Australian Ringneck and Red Wattlebird, with the first two species recorded nearly every week (Table 1). Four species appear to have established in the area during the period of recording: Rainbow Lorikeet (1983), Rock Dove (1993), Willie Wagtail (1993) and White-cheeked Honeyeater (2006). Ten species markedly increased in

Table 1. Weekly frequency of occurrence (%) of species recorded during 7 years, 1980–2007.

* introduced; ** established naturally (i.e. not released by humans). Names as in Christidis and Boles (2008).

| Species | Survey period (No. of weeks) | | | | | | |
|----------------------------|------------------------------|--------------|--------------|--------------|----------------|----------------|----------------|
| | 1980 (50) | 1981 (50) | 1982 (52) | 1983 (52) | 1993/4 (53) | 1994/5 (52) | 2006/7 (52) |
| *Rock Dove | | | | | 19 | 17 | 4 |
| *Laughing Dove | 100 | 100 | 100 | 100 | 89 | 100 | 94 |
| *Spotted Dove | 14 | 26 | 8 | 4 | 40 | 67 | 4 |
| Fork-tailed Swift | | | | 2 | | | |
| **Australian White Ibis | | | | | | | 2 |
| <i>Accipiter</i> sp. | | | | | 2 | | |
| Australian Hobby | | | 2 | | | | |
| Carnaby's Black-cockatoo | 24 | 4 | 8 | | 30 | 52 | 60 |
| **Galah | | 14 | 4 | 4 | 11 | 12 | 13 |
| *Little Corella | | 4 | | 8 | 47 | 67 | 48 |
| *Rainbow Lorikeet | | | | 13 | 90 | 100 | 100 |
| Australian Ringneck | 46 | 82 | 71 | 85 | 60 | 81 | 23 |
| Pallid Cuckoo | | 4 | 12 | | | | |
| *Laughing Kookaburra | 2 | 6 | 17 | 21 | 70 | 42 | 40 |
| Rainbow Bee-eater | | 2 | 6 | 2 | | | |
| Striated Pardalote | | | | | | 10 | 2 |
| Singing Honeyeater | 100 | 100 | 100 | 100 | 98 | 100 | 100 |
| Western Wattlebird | | | | | 2 | | |
| Red Wattlebird | 26 | 24 | 33 | 35 | 87 | 100 | 83 |
| Brown Honeyeater | 12 | 18 | | 13 | 58 | 90 | 81 |
| **White-cheeked Honeyeater | | | | | | | 96 |
| Black-faced Cuckoo-shrike | 22 | 28 | 23 | 37 | 41 | 44 | 23 |
| Grey Butcherbird | 8 | | | | 2 | | |
| Australian Magpie | 24 | 30 | 50 | 52 | 57 | 73 | 83 |
| **Willie Wagtail | | | | | 8 | 42 | 56 |
| Australian Raven | 54 | 66 | 44 | 77 | 90 | 94 | 96 |
| Magpie-lark | | 8 | 6 | 8 | 60 | 87 | 87 |
| Silveryeye | 60 | 62 | 50 | 54 | 34 | 60 | 56 |
| Welcome Swallow | 36 | 30 | 15 | 21 | 28 | 71 | 42 |
| Tree Martin | 56 | 72 | 77 | 63 | 38 | 37 | 2 |

their frequency of occurrence during the course of the study: Carnaby's Black-cockatoo (1993), Little Corella (1993), Rainbow Lorikeet (1993), Laughing Kookaburra (1993), Red Wattlebird (1993), Brown Honeyeater (1993) and Magpie-lark (1993). The only species that declined in frequency of occurrence was the Trec Martin (from 1993, and markedly so in 2006).

Annotated list of species

Species are listed from highest to lowest frequency of occurrence.

Singing Honeyeater *Lichenostomus virescens* (overall frequency of occurrence = 99.7%). Resident, breeding. Ecologically versatile: Seen capturing spiders and insects on pot plants, at the edges of windows, under pergolas, and in vegetable gardens, as well as taking nectar from Coral Tree *Erythrina* sp., Blue Jacaranda *Jacaranda mimosifolia* Bottlebrush *Callistemon* sp. and *Grevillea* sp. Noted as early as c. 1840 as 'particularly fond of gardens, where it is very destructive to the soft fruits' (Gilbert nd). The most abundant honeyeater species in 1912–15 (Alexander 1921).

Laughing Dove *Streptopelia senegalensis* (97.5%). Resident, breeding. Seen feeding on seeds whenever soil is disturbed; also eating seeds of squashed figs and pericarps of olives on footpaths. Listed by Alexander (1921) as plentiful about Perth in 1912–15.

Australian Raven *Corvus coronoides* (74.8%). Regarded by Alexander (1921) as common in 1912–15.

Australian Ringneck *Barnardius zonarius* (64.0%). Seen feeding on fruits of almond and Cape Lilac *Melia azedarach* trees. Regarded by Alexander (1921) as the commonest species of parrot in 1912–15. This species was least frequent in 1980 and 2006/7.

Red Wattlebird *Anthochaera carunculata* (55.7%). Has apparently increased since 1993, though more likely simply due to the occurrence of Coral Trees and Illyarrie *Eucalyptus erthyrocorys* near or in Caddy Avenue. Seen foraging occasionally around hanging baskets and cobwebs under a patio for spiders.

Silvereve *Zosterops lateralis* (53.5%). Not or infrequently recorded from August to December, implying that breeding occurs elsewhere. Seen feeding at flowers of Coral Trees. In c. 1840 noted as abundant in gardens and destructive of figs and grapes, and considered 'as numerous as sparrows in England' (Gilbert nd). Very plentiful in 1912–15 (Alexander 1921), but declined from the 1940s as a breeding species in urban areas (Stranger 2006). The data in Table 1 indicate no marked change in occurrence.

Australian Magpie *Cracticus tibicen* (52.9%). Resident. The feeding habitat of this species (lawns) is best provided in parks and to a

lesser extent along street verges. Most blocks are small and lack lawn. Seen feeding once on pericarps of fallen olive fruits. Considered 'extremely shy' and 'no where very abundant' in c. 1840 (Gilbert nd). Very plentiful in 1912-15 (Alexander 1921).

Tree Martin *Petrochelidon nigricans* (49.0%). Apart from 2006-07, this species was observed at all times during the year.

Rainbow Lorikeet *Trichoglossus haematodus* (44.0%). Seen feeding on palm flowers and seed, and taking Bottlebrush, Coral tree and eucalypt nectar throughout the suburb. Can be seen everyday in the suburb. Extremely mobile.

Brown Honeyeater *Lichmera indistincta* (39.3%). See comment under Red Wattlebird. Seen foraging at flowers of *Hakea*, *Grevillea*, *Illyarrie*, *Metrosideros* and Coral Tree. Noted by Gilbert (nd) in c. 1840 as 'nearly always in the immediate vicinity of water'.

Magpie-lark *Grallina cyanoleuca* (36.8%). The increased frequency since 1993 may represent the proximity of Caddy Avenue to the extensive parklands around Lake Monger. Regarded by Gilbert (nd) as occurring in c. 1840 in large numbers 'on the banks and mudflats in the lakes around Perth' and by Alexander (1921) as uncommon and very local in the neighbourhood of Perth in 1912-15.

Welcome Swallow *Hirundo neoxena* (34.9). A few nests can be seen under the roof of a viewing

platform at Lake Monger (just outside the suburb), but none have been seen at West Leederville train station or under verandahs at West Leederville Primary School or the Catholic Education Centre. Gilbert (nd) found this species nesting in buildings in c. 1840, and it nested at least in the period 1948-51 under the awning of a shop in Cambridge Street (R. Stranger pers. comm.).

Black-faced Cuckoo-shrike *Coracina novaehollandiae* (31.3%). Can be seen at any time of the year, but it is not regular in its occurrence. There can be long intervals between records.

Laughing Kookaburra *Dacelo novaeguinae* (28.8%). Resident. Known to eat goldfish. Considered 'fairly common' in 1912-15 (Alexander 1921).

Carnaby's Black-cockatoo *Calyptorhynchus latirostris* (25.5%). More frequently recorded (flying over) since 1993 than before. In 1993-4, recorded nearly every week between May and August, whereas in 1994-5 and 2006 not recorded November-March and July-September respectively. Has this species become more reliant on the metropolitan region since the early 1990s? I have an undated (probably 1977) photo of 38 birds feeding on fruits on two almond trees at 73 Woolwich Street.

Little Corella *Cacatua sanguinea* (25.2%). All corellas seen close up were identified as of this species. In summer, just before dusk, large flocks of 50-100 birds seen

flying overhead from Lake Monger to the south. Seen feeding on fruits of Illyarrie, Peppercorn tree *Schinus molle* and Cape Lilac on 24 January 1996. At Caddy Avenue, usually heard between November and April. In Clune Avenue (adjacent to Lake Monger), the upper branches of several large fig trees have been killed by the feeding activities of large flocks of this species.

Spotted Dove *Streptopelia chinensis* (23.3%). Resident; much less abundant than the Laughing Dove. Seen feeding on pericarps of olives fallen on a footpath. Listed by Alexander (1921) as plentiful in Perth and the nearer suburbs in 1912–15.

Willie Wagtail *Rhipidura leucophrys* (15.2%). In recent years can be seen everywhere in the suburb. Very confiding: One bird could be called up to peck at my hand. In c. 1840 'the most familiar of all birds...entering [houses] to pick up the crumbs on the floor' (Gilbert (nd)). Alexander (1921) regarded this species as very plentiful in 1912–15, and this was still the case in the 1940s (Sedgwick 1944; Serventy 1948).

White-cheeked Honeyeater *Phylidonyris niger* (13.9%). First seen on 28 March 1993 silently foraging in garden at 73 Woolwich Street. Next seen in August 2004. A pair built a nest under a pergola at 1 Caddy Avenue and reared two young in September 2005. This nest was then rapidly dismantled. In 2009 this species consistently occurred

along Kimberley Street (between Caddy Avenue and Cambridge Street) and was not recorded as far west as Northwood Street or as far east as Carlton and Holyrood Streets. Seen feeding at Grevillea, Bottlebrush and Coral Tree flowers. Noted in c. 1840 by Gilbert (nd) as a 'remarkably shy species, only found in the most secluded places in the Bush...but in the vicinity of Perth and Fremantle is very abundant'. This species occurred in few localities about Perth in 1912–15 (Alexander 1921) and was regarded by Serventy (1948) as rare and localized.

Galah *Eolophus roseicapillus* (9.4%). All birds seen are of the WA subspecies and not of the Kimberley/eastern states subspecies.

Rock Dove *Columba livia* (6.7). Pigeons (presumably feral) are fed by a resident in Vincent Street West (east of Kimberley Street), where large flocks of 50–100 birds have been seen perched on a verandah and feeding on lawn adjoining Lake Monger Drive.

Pallid Cuckoo *Cacomantis pallidus* (2.5%). Heard calling only in August and September.

Striated Pardalote *Pardalotus striatus* (1.7%). Heard only in July, September and October 1994, October 2006, and November 2008.

Rainbow Bee-eater *Merops ornatus* (1.4%). One seen perched on powerlines on 31 January 1996; also heard on 11 October 2007. Considered 'a rare bird around Perth' in c. 1840 by Gilbert (nd).

Grey Butcherbird *Cracticus torquatus* (1.4%). Resident. Seems to be always present in or near the grounds of the Catholic Education Centre in Ruislip Street, where there are many tall trees, including Norfolk Island Pine *Araucaria heterophylla*. Between 21 May and 12 November 1995 (18 weeks), heard each week at Caddy Avenue. Regarded by Gilbert (nd) in c. 1840 as a 'very shy wild bird and extremely difficult to approach within gunshot'.

Accipiter sp. (0.3%).

Australian Hobby *Falco longipennis* (0.3%). Seen October 1982.

Western Wattlebird *Anthochaera lunulata* (0.3%). One seen in Cape Lilac tree on 6 April 1996; also heard on 18 January 1997, and on 20 September and 1 and 4 October 2007.

Fork-tailed Swift *Apus pacificus* (0.3%). Seen April 1983.

Nankeen Night-heron *Nycticorax caledonicus*. One plumed rufous adult ate all the goldfish in a pond at 1 Caddy Avenue on one day in January 2001, and was seen in broad daylight soon after perched on a fence.

Australian White Ibis *Threskiornis molucca* (0.3%). First recorded in November 2006. My next record (of 7 birds) was on 27 February 2008 in a carpark behind shops in Cambridge (near Connolly Street and thus just west of West Leederville). One bird was seen flying between Northwood/Ruislip Streets and

Gibney Vista on 26 September 2009.

Southern Boobook *Ninox novaeseelandiae*. One seen in an almond tree at 0700 hr on 1 October 1988; it was being mobbed by Singing Honeyeaters.

Sacred Kingfisher *Todiramphus sanctus*. One individual of this species, seen during November 1995 by a neighbour in Caddy Avenue, was described to me.

Western Gerygone *Gerygone fusca*. One heard on 4 September 2008.

Mistletoebird *Dicaeum hirundinaceum*. One seen briefly (undated) at 73 Woolwich Street.

DISCUSSION

Species occurrence

West Leederville probably supported some 65 species of landbird before European settlement intruded (Storr and Johnstone 1988). During this study 28 native landbird species were recorded, but probably fewer than 8 species now breed in the suburb. More than 90% of species present in the original avifauna are extinct as species breeding locally. Breeding in gardens of the two residences has so far been proven for three species (Laughing Dove, Singing Honeyeater and White-cheeked Honeyeater), and another species (Rainbow Lorikeet) is known to breed within the suburb. It is likely that further species do so.

During the seven years of weekly recording, an average of 11

passerine species was recorded (range 9–13). This number of species varies from that predicted from the study of Grayson *et al.* (2007), as it is more than predicted if Kings Park is regarded as the nearest (1.8 km distant) remnant bushland with an area > 5 ha, but is less than that predicted if replanted bushland at Lake Monger is regarded as the nearest (0.5 km) bush with an area > 5 ha.

The most remarkable changes in the avifauna in Perth suburbs since 1975 are the increase of the Little Corella, Rainbow Lorikeet, White-cheeked Honeyeater, and Willie Wagtail. During 1975–7 I recorded bird species on at least one visit to 13 parks or gardens in suburban Perth, and three of these species were noted at only one of these locations: Lake Monger (Little Corella); University of WA campus at Nedlands (Rainbow Lorikeet); and Lake Claremont (Willie Wagtail). The Rainbow Lorikeet and Little Corella are obvious escapes or releases from cages or aviaries. The Willie Wagtail is thought to have declined after widespread spraying of insecticide in 1956–7 to eradicate infestations of Argentine ants (Stranger 1997; Stranger 2003: 8–9).

No Willie Wagtails were recorded in the period 1966–68 at Pelican Point, Crawley (Job 1972) or in 1978–82 in a garden in Wembley (Bremner 2000). They reappeared in 1987–87 at Pelican Point (Bailey and Creed 1989) and

in Wembley in about August 1995 (Stranger 1997). At 1 Caddy Avenue, West Leederville, there was a large increase in frequency in 1994/5 (Table 1). By 2002, this species was again widespread in the metropolitan region (Bancroft 2002).

Stranger (1998, 2003: 10) did not record White-cheeked Honeyeaters during the 1950s in Wembley, Shenton Park, City Beach, Wembley Downs, Doubleview, Woodlands and Mount Claremont. Serventy and Whittell (1976) first noted it as a late summer and autumn visitor in Nedlands in 1970. I noted it in Banksia woodland in Kings Park in May 1976 and in the botanic garden in July 1977; it bred in Kings Park in 1982 (Shannon 1984) and was scarce there in 1987 (O'Connor 2005). This species was first seen at Pelican Point in March 1988 (Bailey 1988) and then regularly during autumn and winter in 1991 (Bailey 1991). The White-cheeked Honeyeater was recorded at Lake Monger in July 1989 (Standring and Wilcox 1989) and again in July 1999 (Brockman 1999), and was first recorded in Maylands in 1991 (R. Stranger, pers. comm.) and in Shenton Park and Nedlands in 2000 (Berry and Berry 2008). The cause of the increase of this species is not known.

The only places in West Leederville where I have recorded the New Holland Honeyeater *Phylidonyris novaehollandiae* are in Joseph Street and in Kimberley Street (between Argyle and

Woolwich Streets), though I have seen it in Bourke and Richmond Streets north-east of the Mitchell Freeway and at the northern edge of Lake Monger in Leederville, as well as in Connolly Street in Wembley.

Why are there so few bird species present?

Most houses in West Leederville are situated on blocks smaller than the traditional quarter acre block seen in other suburbs. Gardens feature a mixture of fruit trees, ornamental trees (with Blue Jacaranda, eastern states eucalypts, and palms most popular), and shrubs (rose bushes, creepers etc). Compared to c. 300-400 plant species present before the suburb was cleared of its original vegetation, there are probably at least 100 plant species in gardens, and these should support some invertebrate species. Lawn is limited in or absent from most gardens. Since the 1977 drought, the representation of nectar-producing plants (e.g. *Grevillea*, mallee, WA goldfields eucalypts) in gardens has increased. However, infilling of larger blocks has decreased the extent of gardens.

Most streets are lined with trees (c. 13 species), mainly Brush Box *Lophostemon confertus*, Blue Jacaranda, Cajuput *Melaleuca leucadendra*, Bottlebrush, Plane *Platanus* sp., Coastal Peppermint *Agonis flexuosa*, Weeping Fig *Ficus microcarpa* and Coral Tree. Coral Tree and Bottlebrush trees are most used by honeyeaters,

particularly in winter. Brush Box trees seem devoid of insects, as evidenced by very few signs of leaf-chewing, although they are used by Laughing Doves for nesting (R. Stranger pers. comm.).

The major factor likely to have caused the local extinction of many bird species is the unsuitable habitat structure present in the suburb. The vegetation along road verges, in parks, and in gardens is too sparse in comparison to the original bushland. Trees on verges are on average 14 m apart (range 9-28 m), and roads and back lanes average 8 m and 5 m in width (range 6-14 m and 3-6 m respectively), and may present psychological barriers to many of the original bird species. West Leederville also has no robust linkage with any of the nearby remnants of bushland at Kings Park, Herdsman Lake, Bold Park, and Shenton Park, and probably misses out on bushland dependent bird species moving between these remnants.

In addition to the absence of any remnant native vegetation in West Leederville, only seven (?regrowth) individuals of Jarrah *Eucalyptus marginata* in the railway reserve and none of any of the *Banksia* species have been located by me. This is indicative of how pervasive was the ultimate impact on the avifauna of the complete destruction of the original vegetation.

The past

When did most local extinctions

of birds in West Leederville take place? Increased settlement is indicated by the opening of an Anglican church in 1895 (E.W. Doncaster, pers. comm.), a railway station for passenger traffic in 1897 (*The West Australian* 12.7.1897: 3), and a primary school in 1898 (*The West Australian* 2.11.1898: 4). Brighton Street was 'cleared' in 1899 (*The West Australian* 7.4.1899: 6). However, unlike Subiaco, no tramway was operating in West Leederville in 1900 (*The Western Mail* Christmas Number 1900: 95). In 1893–4 there were no named streets in the (not yet named) suburb, but the formation and naming of streets (WA Post Office Directory 1895–; Ruck 1901) was subsequently rapid: 7 (1895); 16 (1897); 32 (1901); 34 (1905); 35 (1910); 37 (1920); and 44 (2009). In 1893–4 the only building was the Roman Catholic Boys' Orphanage, just to the west of Connolly Street, and not strictly part of West Leederville (WA Directory 1893–4). Settlement progressed from West Perth, with the number of residences at 28 (in 1895), 112 (1897), 312 (1901), 605 (1905), 852 (1910), and 1096 (1920). At present, discounting recent subdivision and infill, there are about 1440 buildings in the suburb.

The above information implies that habitat destruction for housing peaked in the period 1910–1920.

The future

West Leederville, like the rest of south-west WA, is undergoing

anthropogenic climate change, in particular reduced rainfall and increased temperature (Bureau of Meteorology 2009). This process of aridification should result in some inland bird species colonizing and establishing in the inner Perth metropolitan area. Prime candidates include Crested Pigeon *Ocyphaps lophotes*, Budgerigar *Melopsittacus undulatus*, Blue-breasted Fairy-wren *Malurus pulcherrimus*, Chestnut-rumped Thornbill *Acanthiza uropygialis*, Spiny-cheeked Honey-eater *Acanthagenys rufogularis*, White-fronted Honeyeater *Purnella albifrons*, Black Honeyeater *Sugomel niger*, Pied Butcherbird *Cracticus nigrogularis*, Red-capped Robin *Petroica goodenovii*, and Zebra Finch *Taeniopygia guttata*. In contrast, the desert areas of WA are experiencing increased rainfall, and this should facilitate the establishment in urban areas of the Common Starling *Sturnus vulgaris* and House Sparrow *Passer domesticus*, two species at present common to the east of the WA/South Australia border.

Many of the bird species that persist in remnants of Banksia woodland at Kings Park and Bold Park (listed in Berry and Berry 2008) are manifestly unable to survive as breeding populations in inner suburban gardens and parks. Yet, several of these species have been recorded from time to time in the urban matrix. If local and State governments were to encourage suburban residents to re-establish a network of habitat patches resembling the original

woodland in structure and dominant species, vagrant species may be encouraged to form a more stable metapopulation throughout the western suburbs of Perth. The principles for designing ecological linkages so as to reduce the detrimental impact on birds of isolated areas of bushland are well understood (Davis and Brooker 2008).

The railway reserve, parts of larger parks, and some streets could be planted with *Phytophthora*-tolerant Jarrah (Stukely *et al.* 2007), a greater variety of nut-bearing trees could be planted in gardens and parks so that seeds for black-cockatoos are available continuously throughout the year, and native shrubs (of local provenance) that provide cover and food resources for insectivorous birds could be made available free of charge to ratepayers for planting in gardens. Because power poles and wires were removed from most of West Leederville in the late 1990s, it should now be possible to plant more street trees, cease the brutal pruning of the past, and reconfigure and repair the degraded landscape that has existed for more than 100 years. Local government should actively provide more relevant community educational information as to how residents can encourage birdlife.

Finally, much of the extensive area of lawn on the western and eastern sides of Lake Monger could be replanted with local

plant species to approximate the structure and floristics of the original woodland of Flooded Gum *Eucalyptus rudis*. This would provide a large area of bushland immediately adjacent to West Leederville, which combined with the improved street and gardenscapes described above, should increase the avifauna able to persist in the suburb.

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